

CLAIMS

What is claimed is:

1. An apparatus, comprising:
 - a bench having an optical component;
 - a groove formed in the bench, the groove configured to accommodate an optical fiber; and
 - a ferrule, including a recess region to accommodate the optic fiber when the ferrule is mounted onto the bench, the groove and the ferrule being configured to passively aligning the optical fiber and the optical component on the bench.
2. The apparatus of claim 1, wherein the groove comprises but is not limited to one of the following types of shapes, V-groove or trench.
3. The apparatus of claim 2, wherein ferrule is stepped in shape.
4. The apparatus of claim 1, wherein the bench is made from etched silicon.
5. The apparatus of claim 1, wherein the bench further comprises a lens or waveguide optically positioned between the optical component and the optic fiber.
6. The apparatus of claim 1, wherein the optical component is a optical receiver.
7. The apparatus of claim 1, wherein the optical component is an optical transmitter.
8. The apparatus of claim 1, further comprising a sleeve configured to accommodate the silicon bench and ferrule, the sleeve further comprising a receptacle

configured to receive a plug-in connector which optically couples the fiber cable and a fiber optic network or link.

9. The apparatus of claim 1, wherein the bench further comprises a plurality of optical components, lenses or waveguides and grooves, each of the grooves configured to accommodate one of a plurality of fiber optic cables respectively, and wherein the ferrule includes a plurality of the recess regions to accommodate the plurality of optic fibers when the ferrule is mounted onto the bench, the groove and the ferrule being configured to passively aligning the plurality of optical fibers and the plurality of optical components on the bench respectively.

10. A method of assembling an optical connector, comprising:
positioning an optical component and lens or waveguide onto a bench;
inserting a fiber optic cable into a stepped ferrule which accommodates the bench;
and
placing the ferrule in the groove, the groove and ferrule cooperating together to optically align the fiber optic cable and the optical component on the bench.

11. The method of claim 10 further comprising fabricating the bench including the groove by etching a silicon substrate.

12. The method of claim 10, further comprising fabricating the ferrule to include a stepped portion.

13. The method of claim 10, further comprising providing a lens between the optical component and the fiber optic cable.

14. The method of claim 10, wherein the optical component is an optical receiver.

15. The method of claim 14, wherein the optical component is an optical transmitter.

16. The method of claim 10, further comprising providing a sleeve around the silicon bench and ferrule, the sleeve including a receptacle configured to receive a plug in connector that optically couples the fiber optic cable with an optical network or link.